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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/773,804
Filing Date: February 06, 2004
Appellant(s): YAMANAKA ET AL.

Ognyan I. Beremski
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 6/27/08 appealing from the Office action mailed 1/7/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The summary of claimed subject matter contained in the brief is correct.

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

7,155,180	Kim et al	12-2006
2004/0203472 A1	Chien	10-2004

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-2, 5-8, 11-13, 18-19 and 22-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Kim et al. (U.S. Patent No 7,155,180 B2).

As per claims 1, 7 and 18, Kim et al teaches a method for measuring IQ path mismatch in transceivers, the method comprising: estimating a transmitter IQ mismatch in a form of gain and phase response for transmitter I and Q paths sharing a receiver path (see fig.9 element TX and col.2, lines 59-67 and col.3, lines 35-40 and col.6, lines 9-35 and col.10,lines 35-59); and estimating a receiver IQ mismatch in a form of gain and phase response for receiver I and Q paths sharing a signal source (see fig.9 element RX and col.2, lines 59-67 and col.3, lines 35-40 and col.6, lines 9-35 and col.10,lines 35-59).

As per claims 2, 8 and 19 Kim et al teaches wherein estimating a transmitter IQ

mismatch and estimating a receiver IQ mismatch further comprises measuring a difference in the gain and phase response between the transmitter I and Q paths and between the receiver I and Q paths (see fig.9 element and col.9, lines 40-45).

As per claims 5, 11 and 22, Kim et al inherently teaches compensating for the difference of the transmitter and receiver I and Q paths using a digital FIR filter (see col.10, lines 25-26).

As per claims 6, 12 and 23, Kim et al inherently teaches utilizing iterative estimation for filter tap parameters during the compensating (see col.10, lines 23-26).

As per claim 13, Kim et al teaches method for estimating IQ path mismatch in a transceiver, the method comprising: measuring a difference in the gain and phase response between transmitter I and Q paths and between receiver I and Q paths of a transceiver (see fig.9 and col.9, lines 40-48) the transmitter I and Q paths sharing a receiver path and the receiver I and Q paths sharing a signal source (see figs. 6 and 7 and page 2 [0015, 0017 and 0022]); compensating for the difference of the transmitter and receiver I and Q paths using a <u>digital FIR filter</u> (see col.10, lines 10-26).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 3-4, 9-10, 14-17 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (U.S. Patent No 7,155,180 B2) in view of Chien (U.S. Pub No 2004/0203472 A1).

As per claims 3 and 9, Kim et al teaches all the features of the claimed invention except wherein measuring further comprises sending a tone signal and measuring a power and phase shift for all of desired frequency points.

Chein teaches wherein measuring further comprises sending a tone signal (see page 6 [0097], and page 9 [0118]) and measuring a power (see [0110] and phase shift for all of desired frequency points (see page 18 [00234-0235]).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Chein into Kim as to perform the magnitude square operation which would be used to estimate intermediate values required to compute the transmitter imbalance as taught by Chein (see [0235]).

As per claims 4 and 10, Kim et al teaches all the features of the claimed invention except measuring further comprises sending uniformly spaced multi-tone white signals, taking a fast Fourier transform (FFT) of a unit period of the uniformly spaced multi-tone white signals, and calculating the response from a power and phase of each tone.

Chein teaches wherein measuring further comprises sending uniformly spaced multi-tone white signals, taking a fast Fourier transform (FFT) of a unit period of the uniformly spaced multi-tone white signals, and calculating the response from a power and phase of each tone (see page 9 [0018-0119] and page 24 [0319]).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Chein into Kim as to perform the magnitude square operation which would be used to estimate intermediate values required to compute the transmitter imbalance as taught by Chein (see [0235]).

As per claims 14-15 and 20-21, Kim et al teaches all the features of the claimed invention except wherein measuring further comprises sending a tone signal and measuring a power and phase shift for all of desired frequency points.

Chein teaches wherein measuring further comprises sending a tone signal (see page 6 [0097], and page 9 [0118]) and measuring a power (see [0110] and phase shift for all of desired frequency points (see page 18 [00234-0235]).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Chein into Kim as to perform the magnitude square operation which would be used to estimate intermediate values required to compute the transmitter imbalance as taught by Chein (see [0235]).

As per claim 16, Kim et al inherently teaches utilizing iterative estimation for filter tap parameters during the compensating (see col.10, lines 23-26).

As per claim 17, Kim and Chein in combination would teach comprising performing the measuring and compensating for spectrum efficient modulation o perform the magnitude square operation which would be used to estimate intermediate values required to compute the transmitter imbalance as taught by Chein (see [0235]).

(10) Response to Argument

A: In pages 7-9 appellant argues that Kim does not teach or suggest at least the limitation of "estimating a transmitter IQ mismatch in a form of gain and phase response for transmitter I and Q paths sharing a receiver path," as recited by the Appellant in independent claims 1, 7 and 18. Examiner respectfully disagrees.

B: As shown in fig.9 of Kim "estimating a transmitter IQ mismatch in a form of gain and phase response for transmitter I and Q paths sharing a receiver path," is clearly taught. The Mismatch estimation TX box in fig.9 of Kim is receiving it inputs from the output of mixers II and IQ which generate gain and phase. These gain and phase are being utilized by the transmitter to estimate a mismatch. Therefore appellant's arguments are moot and this case stand rejected as stated in the final office action dated 1/7/08.

C: In page 10, appellant argues that Kim does not teach "signal to be a predetermined value. However, Kim does not disclose any measuring of a difference in the gain and phase response between the transmitter I and Q paths and between the receiver I and Q paths for purposes of estimating a transmitter IQ mismatch and a receiver IQ mismatch" as recited in claims 2, 8 and 19. Examiner respectfully disagrees.

As disclosed in Kim col.9, lines 40-45 and col.14, lines 27-30 a phase difference between the In-phase and quadrature components are calculated. This calculation is derived from the gain and phase compensation values acquired from the sum of square values of the I and Q component (see col.9, lines 43-44) therefore the claimed

limitations are taught by Kim and this case stand rejected as stated in the final office action dated 1/7/08.

D: In page 11, appellant argues that Kim does not teach compensating for the difference of transmitter and receiver I and Q paths is achieved by using a digital FIR filter as recited in claims 5, 11 and 22. Examiner respectfully disagrees.

As disclosed in Kim col.10, lines 25-26 the compensation mismatch is performed by a digital filter. Note that the mismatch compensation is used in the receiver and transmitter portions to determine the phase and gain difference therefore the claimed limitations are taught by Kim and this case stand rejected as stated in the final office action dated 1/7/08.

E: In page 13 appellant argues that Kim does not teach “utilizing iterative estimation for filter tap parameters during the compensating," as recited in claims 6, 12 and 23. Examiner respectfully disagrees.

As disclosed in col.10, lines 25-34, the mismatch compensation is performed in a digital filter using adjust coefficient of filter. It is well Known and documented in the art that digital filter is functionally equivalent to both FIR filter and equalizer. These FIR filter and equalizer are also both well known to perform feedback estimation using filter tap coefficients therefore the claimed limitations are inherently met by Kim and this case stand rejected as stated in the final office action dated 1/7/08.

F: In page 15, appellant argues that Kim does not teach "measuring a difference in the gain and phase response between transmitter I and Q paths and between receiver I and Q paths of a transceiver, the transmitter I and Q paths sharing a receiver

path and the receiver I and Q paths sharing a signal source," as recited by the Appellant in claim 13. Examiner respectfully disagrees.

Claim 13 falls under the rational as disclosed in section **C** above and col.9, lines 40-48 and coil.14, lines 27-30 of Kim.

II. A. In pages 16-18 appellant argues that the combination of Kim and Chien does not Render claims 3 and 9 unpatentable and that Kim alone does not teach any measuring of power. Examiner respectfully disagrees.

As disclosed in Kim the sum of square values of the I and Q component (see col.9, lines 43-44) is well known in the as process to determine power measurement or signal strength measurement or signal quality measurement. In response to applicant's argument that the tone signal disclosed by Chien is used for local calibration, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

II. B. In pages 18-19, appellant argues that the combination of Kim and Chien does not disclose the limitations of claims 4 and 10 "wherein the measuring comprises sending uniformly 18 Application Serial No 10/773,804 Appeal Brief in Response to Office Action of January 7, 2008 spaced multi-tone white signals, taking a fast Fourier transform (FFT) of a unit period of the uniformly spaced multi-tone white signals, and calculating the response from a power and phase of each tone". However Chein teaches a FFT (see paragraph [0118-0119] that should be set such that the transmitted tones fall on the center of the frequency bins of the FFT and where the weighting factors which is functionally equivalent to measuring power and phase shift, are set to zero based on transmitted

tone. Therefore combining such teaching with Kim is similar and functionally equivalent the claimed limitations and this rejection stand as stated in the final office action.

II. C. In pages 20-21, appellant argues that the combination of Kim and Chien does not disclose the limitations of claims 14-15 and 20-21 "wherein the measuring comprises sending uniformly 18 Application Serial No 10/773,804 Appeal Brief in Response to Office Action of January 7, 2008 spaced multi-tone white signals, taking a fast Fourier transform (FFT) of a unit period of the uniformly spaced multi-tone white signals, and calculating the response from a power and phase of each tone". However Chein teaches a FFT (see paragraph [0118-0119] that should be set such that the transmitted tones fall on the center of the frequency bins of the FFT and where the weighting factors which is functionally equivalent to measuring power and phase shift, are set to zero based on transmitted tones. Therefore combining such teaching with Kim is similar and functionally equivalent to the claimed limitations and this rejection stand as stated in the final office action.

II. D. In pages 21-23, appellant argues that the combination of Kim and Chien does not disclose the limitations "wherein the compensating comprises utilizing iterative estimation for filter tap parameters". However as disclosed in col.10, lines 25-34 of Kim, the mismatch compensation is performed in a digital filter using adjust coefficient of filter. It is well Known and documented in the art that digital filter is functionally equivalent to both FIR filter and equalizer. These FIR filter and equalizer are also both well known to perform feedback estimation using filter tap coefficients therefore the claimed limitations are inherently met by Kim. Therefore combining such teaching is similar and functionally equivalent to the claimed limitations and this rejection stand as stated in the final office action.

II. E. In pages 23-24, appellant argues that the combination of Kim and Chien does not disclose the limitations "performing the measuring and compensating for

spectrum efficient modulation," as recited by the Applicant in claim 17. However Chien teaches performing power estimation using magnitude squares operation which is similar and functionally equivalent as applicant claimed limitations. Therefore combining such teaching with Kim is similar and functionally equivalent to the claimed limitations and this rejection stand as stated in the final office action.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Emmanuel Bayard/

Primary Examiner, Art Unit 2611

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/Chieh M Fan/

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